www.bre.co.uk

BRE Global Classification Report

Classification of fire performance in accordance with BR 135: 2013 Annex B for a ventilated Marley Eternit rainscreen system with Celotex RS5000 insulation

Prepared for: Celotex

Date: 02 May 2018

Report Number: P104852-1001 Issue: 1.0

BRE Global Ltd
Watford, Herts
WD25 9XX

Customer Services 0333 321 8811

From outside the UK:
T + 44 (0) 1923 664000
F + 44 (0) 1923 664010
E enquiries@bre.co.uk
www.bre.co.uk

Prepared for:
Celotex
Lady Lane Industrial Estate
Hadleigh
Ipswich
IP7 6BA

Prepared by

Name David Farrington

Position Fire Testing Manager

Date 02 May 2018

Signature 

Authorised by

Name Stephen Howard

Position Director of Fire Testing and Certification

Date 02 May 2018

Signature 

bre

Table of Contents

CLASSIFICATION OF FIRE PERFORMANCE IN ACCORDANCE WITH BR 135:2013 Annex B

Sponsor: Celotex, Lady Lane Industrial Estate, Hadleigh, Ipswich, IP7 6BA

Prepared by: BRE Global Ltd, BRE, Bucknalls Lane, Garston, Watford, WD25 9XX, England

Product name: Ventilated façade system with Celotex RS5000 insulation and Marley Eternit natura rainscreen panels

Classification report No.: P104852-1001

Issue number: 1

Date of issue: 02 May 2018

This classification report consists of 24 pages and may only be used or reproduced in its entirety.

1 Introduction

This report presents the classification of the system detailed in Section 2. The classification is carried out in accordance with the procedures given in BR 135 – 'Fire performance of external thermal insulation for walls of multi-storey buildings', Third edition, Annex B 2013. This classification should be read in conjunction with this document and the associated test reports referenced in Section 4.

bre

2 Details of the Classified System

2.1 Description of substrate

The product was installed on to wall number 4 of the BS 8414-2[1] BRE Global test facility. This apparatus is representative of the face of a building and consists of a structural steel test frame with a vertical main test wall and a vertical return wall at a 90° angle to and at one side of the main test wall.

2.2 Description of product

Table 1. List of component parts used in the construction of the system

Item	Description
1	Horizontal 'U'-shaped base channel (40mm×104mm×40mm×1.2mm-thick).
2	Horizontal 'U'-shaped head channel (70mm×104mm×70mm×2mm-thick).
3	Vertical 'C'-shaped studding (50mm×100mm×50mm×1.2mm-thick).
4	Knauf standard wallboard (9.5mm-thick, fixed to internal face of partition).
5	MgO sheathing board. Versaliner (12mm-thick, fixed to external face of partition).
6	Siderise RH25G-090/30/144-156 stone wool open state horizontal cavity barrier with intumescent strip (130mm-deep×75mm-thick).
7	Siderise RVG-090/030/151-159 stone wool vertical cavity barrier (155mm-deep×75mm-thick).
8	Aluminium helping hand brackets (120mm-deep×62mm-wide×75mm-high×5mm-thick).
9	Celotex RS5000 (1200mm-wide×2400mm-long×100mm-thick).
10	'L'-shaped aluminium rails (60mm-deep×40mm-wide).
11	Marley Eternit natura (12mm-thick).

2.2.1 Installation sequence

40mm×104mm×40mm×1.2mm-thick horizontal 'U'-shaped base channel was fixed to the top of each 'floor slab' and into the ground using 6.3×45mm self-drilling screws at 420-440mm centres in two rows 40-50mm apart.

70mm×104mm×70mm×2mm-thick horizontal 'U'-shaped head channel was fixed to the base of each 'floor slab' using 5.5×38mm self-drilling screws at 400mm centres in two rows 45mm apart.

50mm×100mm×50mm×1.2mm-thick vertical 'C'-shaped studding (with a 12mm internal return) was fixed to the horizontal studding through the front using 5.5×25mm self-drilling screws. The vertical studding was fixed at 200-600mm centres on the main wall and 180-600mm on the wing wall. The partition extended beyond the long edge of the main wall floor slab by 110mm and the wing wall floor slab by 220mm).

12mm-thick Versaliner sheathing boards with the long edge horizontal were fixed to the external face of the lightweight steel framework partition using 4.8×45mm self-drilling screws at 100-300mm vertical centres (five fixings per column per board) and 180-600mm horizontal centres.

4mm gaps were left between adjacent boards, the gaps were sealed using Versaseal-FS Euroform sealant.

Galvanised steel folded skewers (350mm-long×25mm-wide×1mm-thick) were fixed to the sheathing boards using 4.8×45mm self-drilling screws between 200-620mm horizontal centres in four rows located; 0mm, 660mm, 3210mm and 7050mm above the top of the combustion chamber.

Siderise stone wool horizontal cavity barriers with intumescent strip (130mm-deep×75mm-thick) were pressed onto the skewers in rows. A cut was made along the length of the skewers local to the tip and the ends were folded to opposite sides to secure the intumescent cavity barriers in place. All barrier edges were sealed with aluminium tape.

Galvanised steel folded skewers (320mm-long×25mm-wide×1mm-thick), folded to 195mm-wide×125mm-deep, were fixed to the sheathing boards using 4.8×45mm self-drilling screws at 275-620mm vertical centres in four columns located: 270mm and 2480mm from the main-wing wall junction on the main wall, 50mm and 1490mm from the main-wing wall junction on the wing wall.

Siderise stone wool vertical cavity barriers (155mm-deep×75mm-thick) were pressed onto the skewers in columns. Each column was bisected by the horizontal cavity barriers. All barrier edges were sealed with aluminium tape.

120mm-deep×62mm-wide×75mm-high×5mm-thick aluminium helping hand brackets each with plastic isolation pad were fixed to the sheathing boards at 210-600mm horizontal centres and 675-910mm vertical centres on the main wall, 365-600mm horizontal centres and 270-900mm vertical centres on the wing wall. The 'L'-shaped helping hand brackets were fixed using two 6.3×50mm self-drilling screws per bracket.

A double layer of 9.5mm-thick Knauf plasterboard was fixed to the internal face of the lightweight steel framework partition using Knauf 42mm-long drywall screws through both layers at 300mm vertical and 600mm horizontal centres.

A single layer of 100mm-thick Celotex RS5000 insulation was fixed to the Versaliner boards using 5.5×135mm self-drilling screws with IDR-70mm×70mm×0.6-0.8mm insulation retaining plates at 450-890mm horizontal and 160-690mm vertical centres. 3M Venture tape sealed all insulation board junctions on the exposed face in addition to the insulation core coincident with the combustion chamber opening.

60mm-deep×40mm-wide 'L'-shaped aluminium rails were fixed vertically to the 'L'-shaped helping hand brackets, using two 4.2×16mm self-drilling screws per bracket, at 210-600mm horizontal centres on the main wall and 365-600mm centres on the wing wall.

12mm-thick Marley Eternit natura boards, long edge horizontal, were fixed to the rails using 5.5×50mm self-drilling screws with Ø16mm EPDM washers at 150-310mm vertical centres (five fixings per column per board) and horizontal centres coincident with the lightweight steel frame studwork. Five full size boards, 1240mm-high, and one 1040mm-high board were installed above the combustion chamber opening with a horizontal panel joint nominally 2.5m above the opening. The main wall Marley Eternit natura boards were 79mm wider from the top of the combustion chamber upwards than those below.

There was a gap of 10mm between adjacent Marley Eternit natura boards on all sides and at the vertical junction between the main and wing wall.

12mm-thick Marley Eternit natura boards were fixed to the top and sides of the combustion chamber reveal using 5.5×50mm self-drilling screws with Ø16mm EPDM washers. At the top of the combustion chamber reveal, there was a single line of fixings at nominal 300mm centres. At the vertical sides of the combustion chamber reveal, there were two columns of fixings: one at 300mm nominal vertical centres and one at 600mm nominal vertical centres. The columns were set 150mm apart.

2.3 Materials and installation

All test materials were supplied and installed by the sponsor. BRE Global were not involved in the sample selection process and therefore cannot comment upon the relationship between samples supplied for test and the product supplied to market.

3 Product Specification

Figure 1. Full-height view of complete system prior to test.

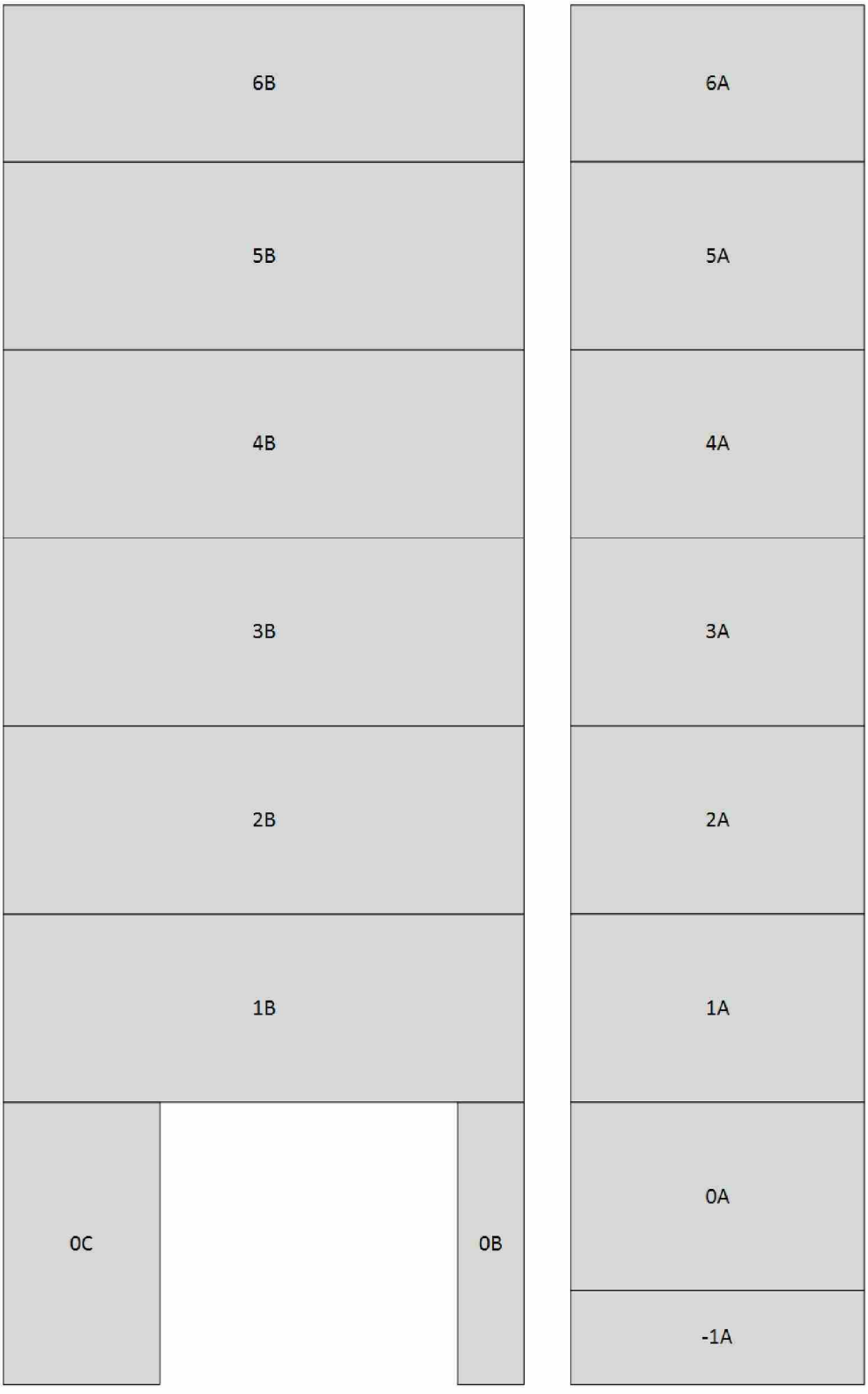


Figure 2. Layout of panels and numbering system used for reporting. Not to scale.

3.1 System drawings

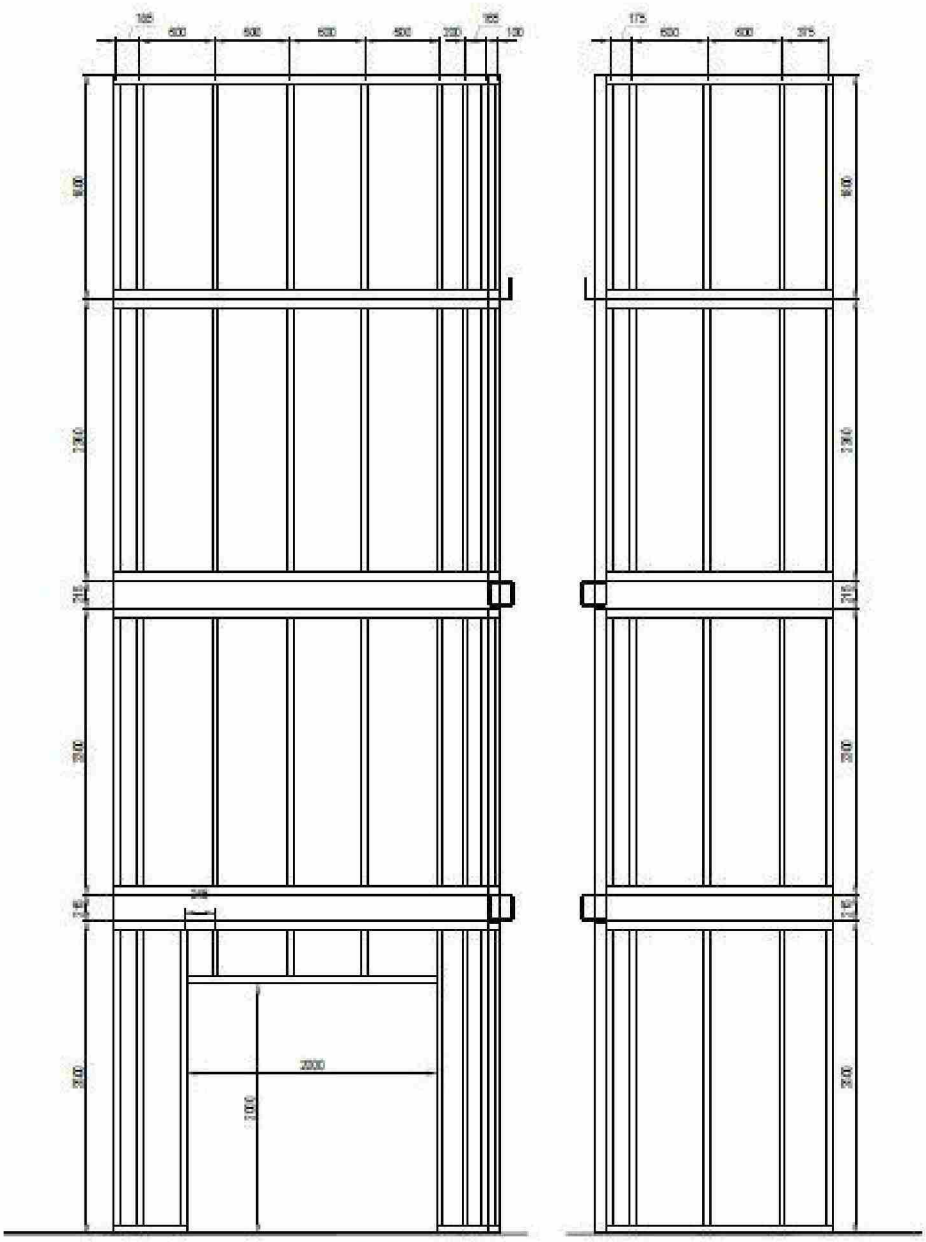


Figure 3. Partition layout (drawing supplied by Test Sponsor).

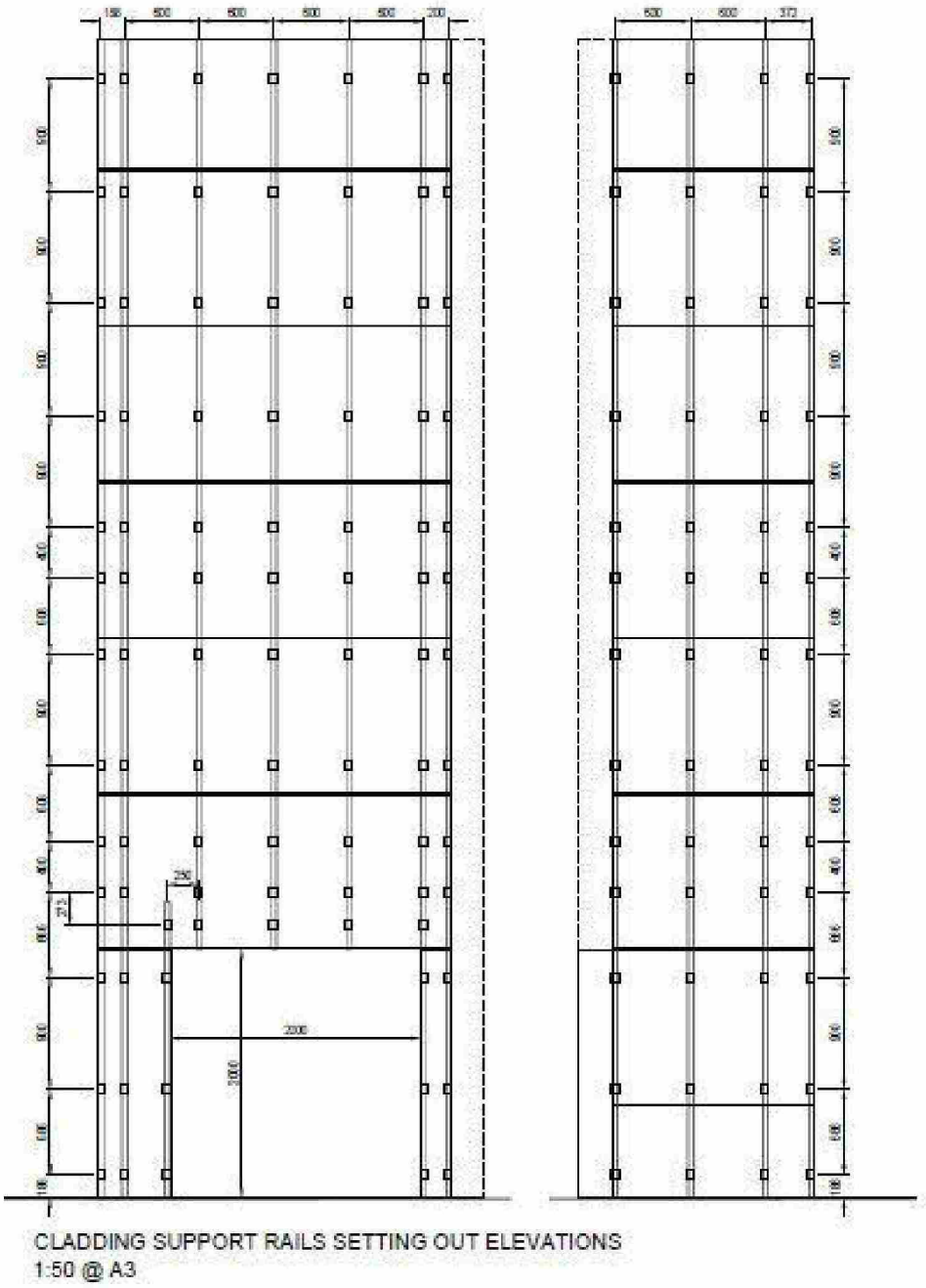


Figure 4. Rail layout (drawing supplied by Test Sponsor).

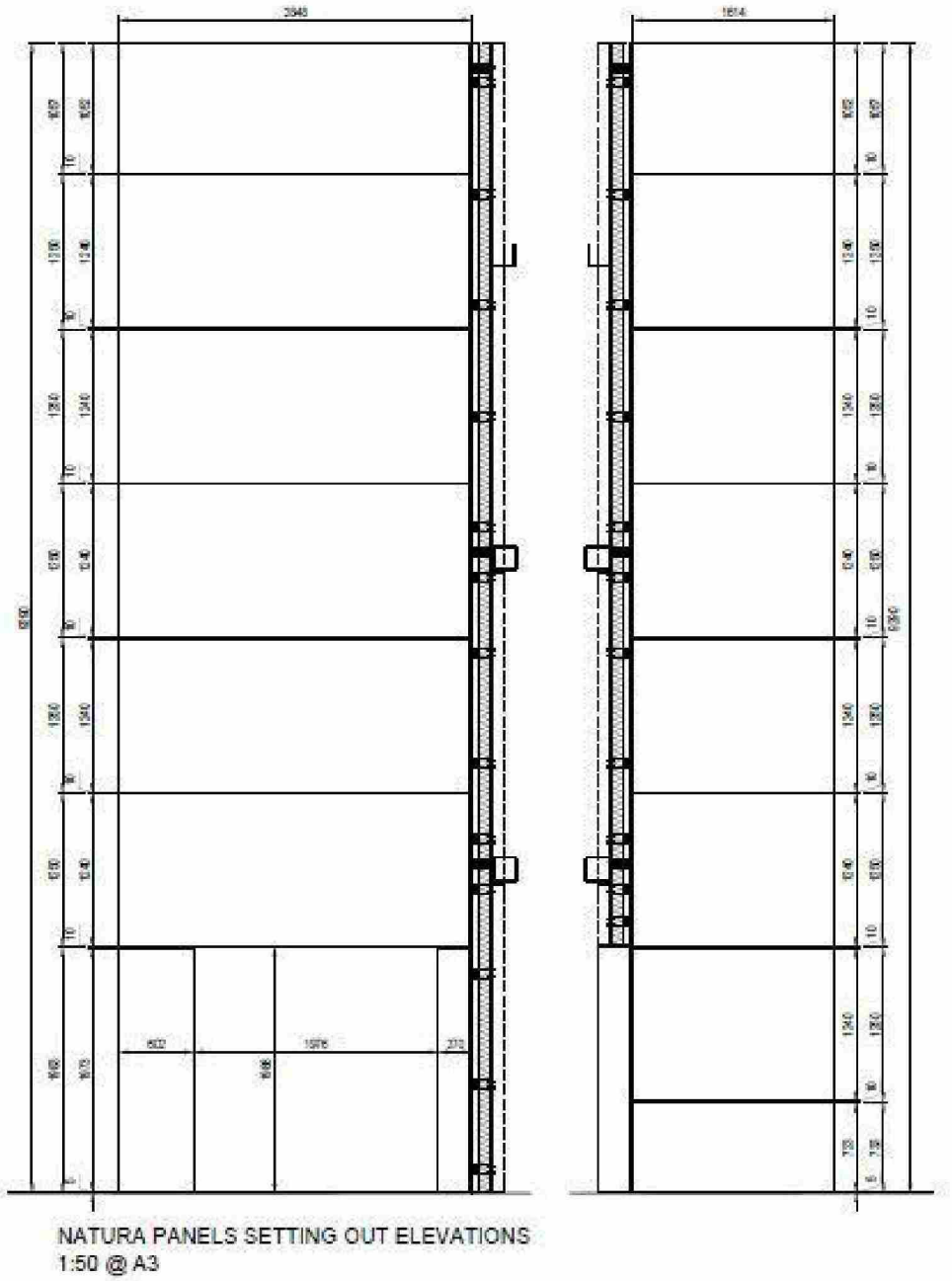


Figure 5. Panel layout (drawing supplied by Test Sponsor).

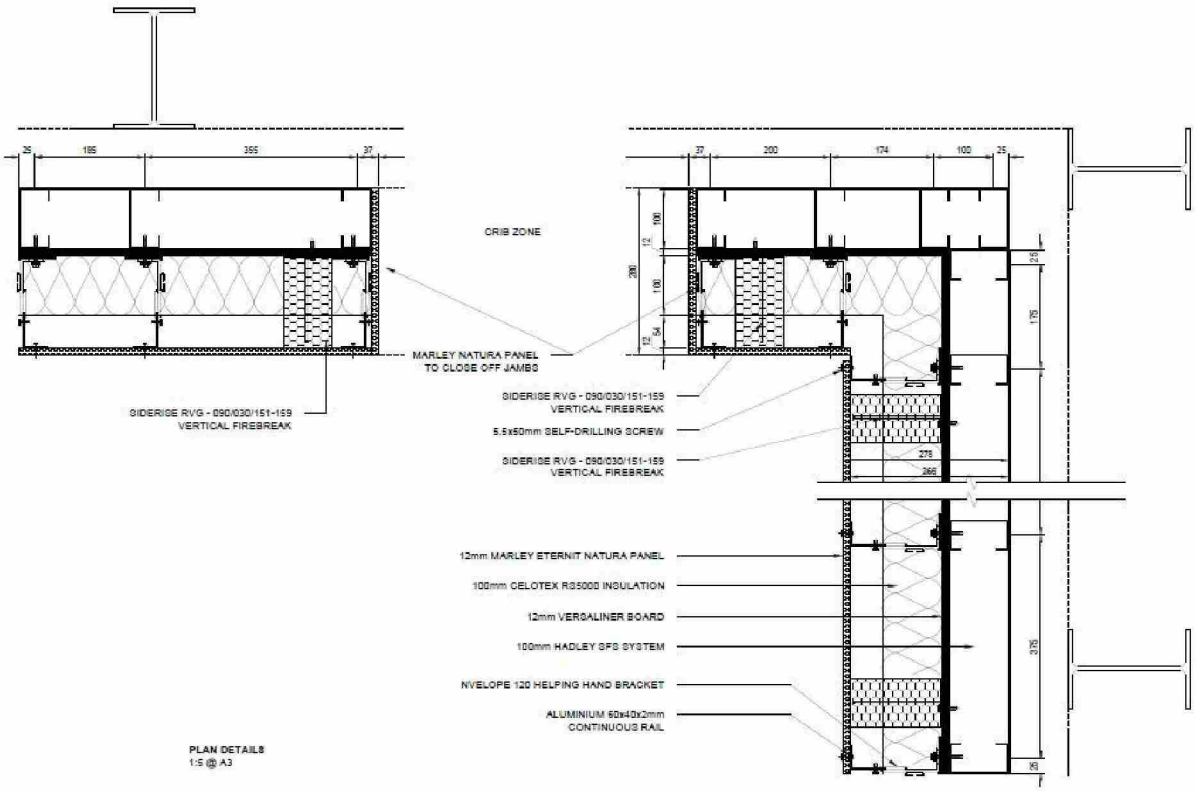
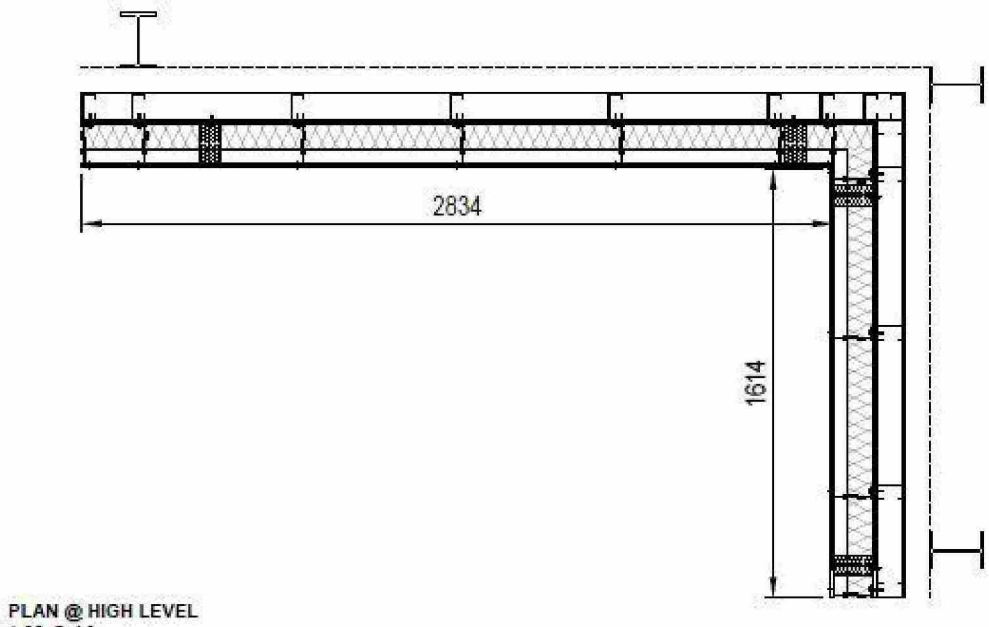
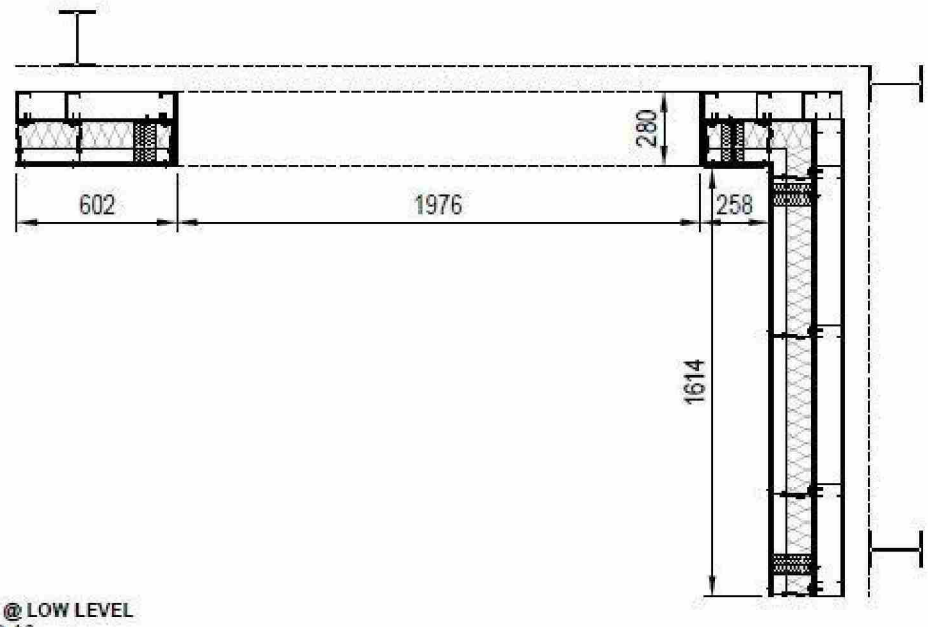


Figure 6. Plan view cross-section detailing layers of system (drawing supplied by Test Sponsor).



PLAN @ HIGH LEVEL
1:20 @ A3



PLAN @ LOW LEVEL
1:20 @ A3

Figure 7. Plan view of system (drawing supplied by Test Sponsor).

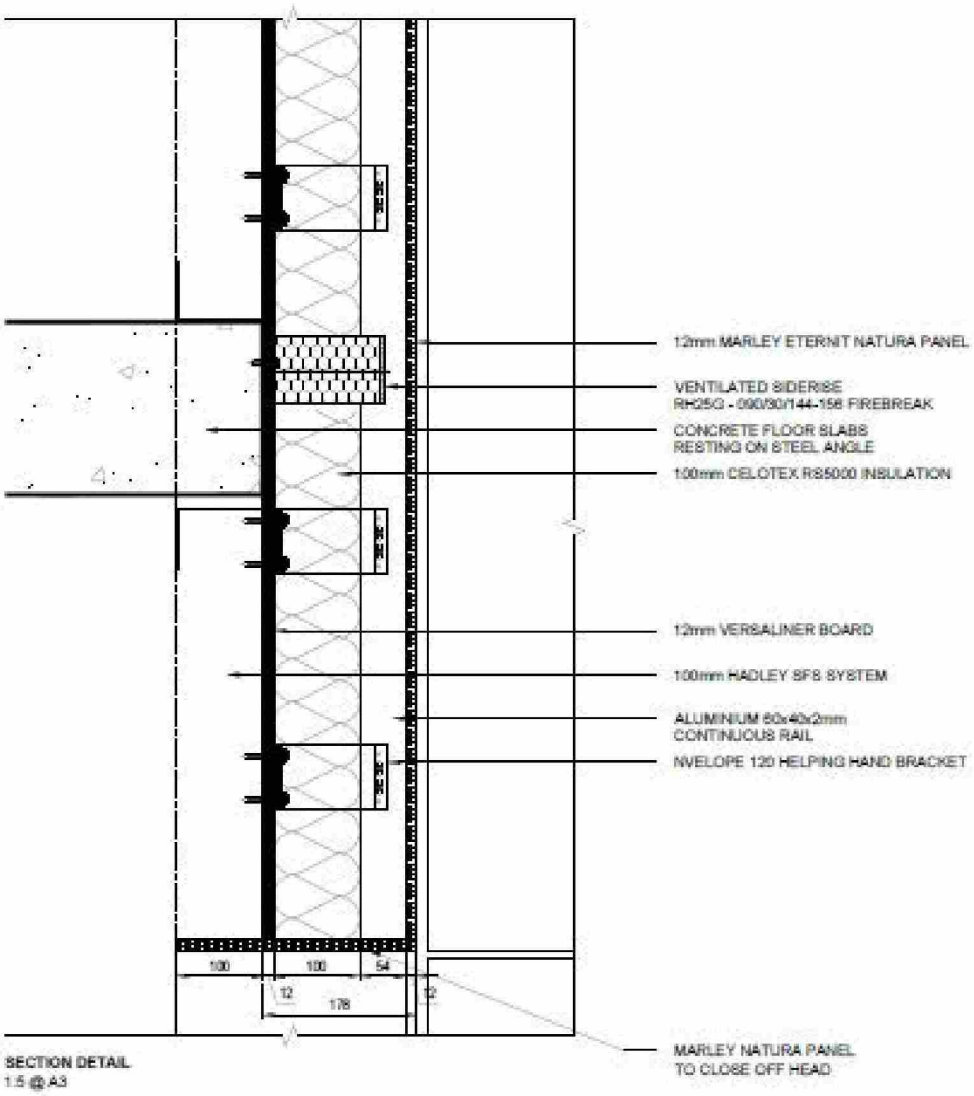


Figure 8. Side view cross-section detailing layers of system (drawing supplied by Test Sponsor).

4 Supporting Evidence

4.1 Test reports

Name of Laboratory	Name of sponsor	Test reports/extended application report Numbers	Test method / extended application rules & date
BRE Global, BRE	Celotex	P104852-1000 Issue: 1.0	BS 8414 Part 2:2015 + A1:2017

4.2 Test results

Test method	**Parameter**	**No. tests**	**Results**	
			Fire spread test result time, t_s (min)	**Compliance with parameters in Annex B BR135:2013**
BS 8414 Part 2: 2015 + A1:2017	External fire spread	1	>15 minutes	Compliant
	Internal fire spread		>15 minutes	Compliant
	System burn through		>15 minutes	Compliant

4.3 Mechanical performance

There was detachment of Marley Eternit panels during the test at 31 minutes 50 seconds (approximately 1200mm×1200mm, 1.44m^2, panel 2B) from an area in line with and starting 1200mm above the combustion chamber opening, that landed approximately 1.3m from the finished face of the main wall. A smaller area of detachment (approximately 600mm×600mm, 0.36m^2, panel 1B) from directly above the combustion chamber opening, was observed at 44 minutes and 04 seconds and landed within 1.2m of the cladding system.

Cracking of the panels was first observed after 14 minutes and 35 seconds of the start of test and continued until 44 minutes and 04 seconds when the last section of panel detachment occurred during the test (60 minutes from ignition). Cracking was evident up to approximately 3.6m above and on the centre line of the combustion chamber opening on the main wall. On the wing wall, cracking was observed up to 0.5m above the combustion chamber opening directly adjacent to the main wall.

Flaming continued on the main wall insulation directly above the combustion chamber opening, up to a height of 2400mm, for the entirety of the 60-minute test. The intensity of flaming reduced from the point at which the crib was extinguished (30 minutes, exposed insulation alight with flame tips extending to a height of approximately 3.6m) to gentle flickering concentrated at the edges of the exposed insulation approximately 2.4m above the combustion chamber at the end of the test (60 minutes after ignition).

4.4 System damage

4.4.1 Marley Eternit natura panels

With reference to *Figure 2*, the damage observed to the Marley Eternit panels was as follows:

Panel 0A – 30% dark discolouration surrounded by brown discolouration, 30% pale discolouration with streaks of pale discolouration. A pattern of cracks was observed towards the main-wing wall junction.

Panel 0B – Mostly undamaged with light discolouration towards the top corner and dark discolouration towards the bottom corner adjacent to the combustion chamber opening.

Panel 0C – Mostly undamaged apart from a patch of light discolouration at the top corner adjacent to the combustion chamber opening.

Panel 1A – A patch of light discolouration (approximately 300mm-wide×900mm-high) towards the main-wing wall junction surrounded by brown discolouration. Dark discolouration towards the edge of the wing wall. A pattern of cracks was observed towards the main-wing wall junction.

Panel 1B – Detachment of a central section approximately 800mm-wide×1200mm-high (additional material detached after the end of the test). Light discolouration on the remainder of the panel surrounded by streaks of dark and pale discolouration. Patterns of cracks were observed on the remaining sections of the panel contained between the bounds of the combustion chamber opening.

Panel 2A – 20% dark discolouration towards the main-wing wall junction surrounded by brown discolouration.

Panel 2B – Detachment of a central section approximately 1200mm-wide×1200mm-high. Light discolouration on the remainder of the panel surrounded by localised areas of dark discolouration. Patterns of cracks were observed on the remaining section of the panel adjacent to the wing wall.

Panel 3A – Brown discolouration towards the base of the panel local to the main-wing wall junction.

Panel 3B – Localised areas of dark and pale discolouration covering a width of approximately 2000mm towards the main-wing wall junction. Cracks were observed near the centre of the panels.

Panel 4A – 70% minor discolouration.

Panel 4B – 5% white discolouration at base surrounded by 20% dark discolouration. 60% smoke discolouration. Cracks were observed near the base of the panels.

Panel 5A – 40% minor discolouration.

Panel 5B – 80% smoke discolouration.

Panel 6A – 10% minor discolouration.

Panel 6B – 70% smoke discolouration.

Combustion chamber surround.

On the panels fitted to the sides of the combustion chamber there was dark discolouration towards the base of the panels with streaks of pale discolouration and localised areas of smoke discolouration. A series of horizontal cracks were observed across the height of the panels.

On the panel fitted to the top of the combustion chamber there was a section of partial detachment due to cracking approximately 500mm-wide. On the remainder of the panel there was cracking near the centre with localised areas of smoke discolouration.

4.4.2 Insulation

4.4.2.1 Main wall

From the ground to the first horizontal cavity barrier there was no visible damage to the insulation either side of the combustion chamber.

Between the first and second row of horizontal cavity barriers

There was no visible damage to the insulation from the outside edge of the main wall to the vertical cavity barrier at the outside edge of the combustion chamber.

In line with the combustion chamber opening the insulation was 90% charred with localised areas of sheathing board visible. The remaining insulation had smoke staining and localised dark discolouration.

Between the vertical cavity barrier at the wing wall edge of the combustion chamber and the main-wing wall junction there was no visible damage.

Between the second and third row of horizontal cavity barriers

There was no visible damage from the outside edge of the main wall to the vertical cavity barrier in line with the outside edge of the combustion chamber.

In line with the combustion chamber opening the insulation was 80% charred with 15% dark discolouration and 5% smoke staining.

Between the vertical cavity barrier in line with the wing wall edge of the combustion chamber and the main-wing wall junction there was no visible damage.

Between the third and fourth row of horizontal cavity barriers

There was no visible damage between the outside edge of the main wall and the vertical cavity barrier at the outside edge of the combustion chamber.

In line with the combustion chamber opening there was smoke staining across the surface of the insulation with localised areas of dark discolouration near the rails.

Between the vertical cavity barrier at the wing wall edge of the combustion chamber and the main-wing wall junction there was no visible damage.

4.4.2.2 Wing wall

From the ground to the first row of horizontal cavity barriers there was no visible damage.

Between the first and second horizontal cavity barriers there was some smoke discolouration and distortion in the outer foil of the insulation local to the main-wing wall junction.

Between the second and third horizontal cavity barriers there was no visible discolouration with some distortion in the outer foil of the insulation local to the main-wing wall junction.

Between the third and fourth horizontal cavity barriers there were localised areas of minor discolouration.

4.4.3 Aluminium rail substructure

The aluminium rail at the centreline of the combustion chamber had been mostly consumed up to a height of approximately 2750mm above the combustion chamber. The supporting 'L'-shaped helping hand brackets had been partially consumed and the plastic isolation pads mostly melted. A section of rail remained intact between the first and second horizontal cavity barriers.

The aluminium rail to the right of the combustion chamber centreline had been consumed up to a height of approximately 2000mm above the combustion chamber. The supporting 'L'-shaped helping hand brackets had been substantially consumed and the plastic isolation pads mostly melted.

The aluminium rail in line with the wing wall edge of the combustion chamber had an area of partial consumption and distortion across an area, approximately 1200mm-high, above the second horizontal cavity barrier. The supporting 'L'-shaped helping hand brackets had been partially consumed and the plastic isolation pads mostly melted.

There was smoke discolouration to all rails across the width of the combustion chamber opening up to the height of the third horizontal cavity barrier. Above this, there were small areas of localised discolouration.

There was no evidence of damage or discolouration to rails positioned outside the width of the vertical cavity barriers in line with the combustion chamber opening.

4.4.4 Horizontal intumescent cavity barriers

4.4.4.1 First row of horizontal cavity barriers

Main wall

From the outside edge of the main wall to the vertical cavity barrier at the outside edge of the combustion chamber there was no activation of the intumescent strip.

In line with the combustion chamber opening there was full activation of the intumescent strip with 70% detachment of the barrier.

Between the vertical cavity barrier at the wing wall edge of the combustion chamber and the main-wing wall junction there was partial activation of the intumescent strip.

Wing wall

Between the main-wing wall junction and the vertical cavity barrier local to the main-wing wall junction there was no activation.

From the vertical cavity barrier local to the main-wing wall junction the intumescent strip had fully activated across a width of approximately 600mm. Beyond this the intumescent strip had only been partially activated.

4.4.4.2 Second row of horizontal cavity barriers

Main wall

From the outside edge of the main wall to the vertical cavity barrier in line with the outside edge of the combustion chamber there was no activation of the intumescent strip.

In line with the combustion chamber opening there was full activation of the intumescent strip with partial detachment of the cavity barrier.

Between the vertical cavity barrier at the wing wall edge of the combustion chamber and the main-wing wall junction there was partial activation.

Wing wall

Between the main-wing wall junction and the vertical cavity barrier local to the main-wing wall junction there was partial activation.

From the vertical cavity barrier at the main-wing wall junction the intumescent strip had fully activated across a width approximately 1000mm. Beyond this there was no activation of the intumescent strip.

4.4.4.3 Third row of horizontal cavity barriers

Main wall

From the outside edge of the main wall to the vertical cavity barrier in line with the outside edge of the combustion chamber there was no activation.

In line with the combustion chamber opening there was full activation.

Between the vertical cavity barrier at the wing wall edge of the combustion chamber and the main-wing wall junction there was partial activation.

Wing wall

From the main-wing wall junction the intumescent strip had partially activated across a width approximately 400mm. Beyond this there was no evidence of activation.

4.4.4.4 Fourth row of horizontal cavity barriers

Main wall

From the outside edge of the main wall to the vertical cavity barrier in line with the outside edge of the combustion chamber there was no activation.

From the vertical cavity barrier at the outside edge of the combustion chamber to the main-wing wall junction there was partial activation of the intumescent strip.

Wing wall

The intumescent strip showed the early signs of activation but no expansion.

4.4.5 Vertical cavity barriers

The vertical cavity barrier at the outside edge of the combustion chamber had no visible damage up to the height of the second horizontal cavity barrier. Above the second horizontal cavity barrier there were localised areas of discolouration.

The vertical cavity barrier at the wing wall edge of the combustion chamber had minor damage up to the height of the second horizontal cavity barrier except for an area of dark discolouration at ground level. Between the second and third horizontal cavity barriers there were localised areas of dark discolouration. Between the third and fourth horizontal cavity barriers there were localised areas of discolouration.

On the wing wall vertical barrier local to the main-wing wall junction there were localised areas of discolouration up to the height of the first horizontal cavity barrier. Between the first and second horizontal cavity barriers there was discolouration across the full height. From the second horizontal cavity barrier there was an area of discolouration approximately 600mm-high. From the third to the fourth horizontal cavity barriers there was no visible damage.

On the vertical barrier at the outside edge of the wing wall there was no visible damage across the full height.

4.4.6 Sheathing board

Main wall

Up to the height of the first row of horizontal cavity barriers there was smoke discolouration.

Between the first and second horizontal cavity barriers there was smoke discolouration with a pattern of dark discolouration approximately 600mm-wide aligned with the centreline of the combustion chamber.

Between the second and third horizontal cavity barriers there was a pattern of dark discolouration surrounded by smoke discolouration varying from approximately 1000mm to 2000mm-wide adjacent to the vertical cavity barrier at the wing wall edge of the combustion chamber. Above this height there was no visible damage except for a strip of smoke discolouration in line with the fourth horizontal cavity barrier.

Wing wall

Up to the height of the second row of horizontal cavity barriers there was no visible damage.

Immediately above the second row of horizontal cavity barriers there was an area of discolouration local to the main-wing wall junction. Above this there was no visible damage.

4.4.7 Lightweight steel framework partition

Up to the height of the second row of ‘floor slabs’ (approximately 3m above the combustion chamber opening) there were localised areas of dark and smoke discolouration. Above this there was no visible damage.

5 Classification and field of application

5.1 Reference of classification

This classification has been carried out in accordance with Annex B of BR 135 – 'Fire performance of external thermal insulation for walls of multi-storey buildings.' Third Edition 2013.

5.2 Classification

The system described in this classification report has been tested and met the performance criteria set in Annex B of BR 135:2013.

5.3 Field of application

This classification is valid only for the system as installed and detailed in Section 2 of this classification report and the associated details found in the related test reports, referenced in Section 4.

6 Limitations

This classification document does not represent type approval or certification of the product.

The classification applies only to the system as tested and detailed in the classification report. The classification report can only cover the details of the system as tested. It cannot state what is not covered. When specifying or checking a system it is important to check that the classification documents cover the end-use application.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons, it is recommended that the relevance of test and classification reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test or classification to ensure that they are consistent with current practices, and if required may endorse the report.

7 References

1 BS 8414-2:2015 + A1:2017, 'Fire performance of external cladding systems – Part 2: Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame', British Standards Institution, London, 2015.

Report Ends